25D760

Final Examination

Academic Year 2025-2026

UID No. 25BCS11964

Program Name/Code: Bachelor of Engineering/ALL

Subject Code : 25SMT-121

Subject Title : Mathematics-I

Semester : 1

Time : 3 Hour

Maximum Marks : 60

Instructions :

- The question paper is consisting of three sections. It is compulsory for students to attempt all
- Question no. 10 & 11 of section C, are compulsory to be attempted.
- Students to attempt any one question from question no. 12 & question no. 13 of section C

NO CALCULATOR IS ALLOWED

Q. No	Statement	CO Mapping	BT Level
	Section A **5x2=10 marks**		
1	Define skew symmetric matrix with an example	CO1	1
2	State the Rank-Nullity Theorem	CO1	1
3	Define Bernoulli's linear differential equation	CO1	1
4	Write order and degree of Differential Equation $[1 + (y')^2]^3 = k^2(y'')^2$	CO1	1
5	Find I.F. of differential equation $(x^2y - 2xy^2)\,dx + (3yx^2 - x^3)\,dy = 0$	CO1	2
	Section B **4x5=20 marK**		
6	Find value of k so that equations $x + y + 3z = 0$ $4x + 3y + kz = 0$ $2x + y + 2z = 0$ have a non-trivial solution.	CO2	3
7	Show that $L:\mathbb{R}^2 \to \mathbb{R}^2$ defined as $T(x, y) = (x + y, x - y)$ is invertible Find its inverse	CO2	3
8	Solve $x\frac{dy}{dx} + 2y = x^2 \log x$	CO3	3
9	Solve $(D^2 - 6D + 9)y = 6e^{3x}$	CO4	3
	Section C **3x10=30 marks**		
10	Verify Cayley Hamilton Theorem for matrix: $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$	CO2	3
11	Find Range space, Null space, Rank and Nullity of matrix $A = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 2 & 3 \\ -1 & 1 & 0 \end{bmatrix}$	CO4	3
	Optional Question of Section C		
12	Solve $(D^2 - 7D + 10)y = e^{2x}\sin x$	CO3	3
	OR		
13	Solve $\frac{d^2y}{dx^2} + \frac{1}{x}\frac{dy}{dx} = \frac{12\log x}{x^2}$	CO3	3

CU UPDATES